

Maritime Iridium Short Burst Data communication terminal with GNSS

GTTS-3000
Installation and User's Manual
Version: 1.7 - January 2016



1. Preface

The information in this Installation and User's Guide is subject to change in order to improve reliability, design or function without prior notice.

In no event GTTSystems B.V. will be liable for technical or editorial errors or omissions herein.

Nor for incidental, special or consequential damages from the furnishing, performance or use of this Installation and User's Guide

2. Warning and notices

Read this installation and User's Manual before unpacking and installing the GTTS-3000.

There are no user serviceable parts inside. Do not open the GTTS-3000 under any circumstances.

If the optional internal backup battery shall be replaced, contact your dealer.

If GTTS-3000 systems were ordered with (optional) mounting magnets, the magnets are in factory mounted to reduce risk of injury.

If magnets are mounted, a warning label will be present inside the box or crate and/or on the mounting peg of the GTTS-3000.

Warning Label:



Warning strong magnetic field

Caution: The magnets are very strong. The 4 magnets have a total holding force of 1240 N (~124 Kg)

3. Document revision history

Revision	Date	Athor	Description
1.6	2015-01-09	M Latour	BIC-Box DB9 pinout added Change of specs
1.7	2016-01-20	M Latour	Footer address change

4. Approvals

CE / EMC EN 60945 (2002), chapter 9
EN 60945 (2002), chapter 10

Phenomenon	Basic Standard	Band
Conducted emission test with a LISN	EN 55016-2-1 (2009) + A1 (2011)	10kHz - 30 MHz
Radiated emission of Magnetic Fields up to 30 MHz	EN 55016-2-3 (2010) + A1 (2010)	150 kHz - 30 MHz
Radiated emission up to 1 GHz (FAC) (Pre test)	EN 55016-2-3 (2010) + A1 (2010)	30 MHz - 1000 MHz
Radiated emission up to 1 GHz (SAC/OATS) (final test)	EN 55016-2-3 (2010) + A1 (2010)	30 MHz - 1000 MHz
Radiated emission up to 1 GHz (SAC)	EN 55016-2-3 (2010) + A1 (2010)	30 MHz - 1000 MHz
Radiated emission up to 1 GHz (FAC)	EN 55016-2-3 (2010) + A1 (2010)	1 - 2 GHz
ESD	EN 6100-4-2 (2009)	-
Radiated Immunity	EN 6100-4-3 (2006) + A1 (2008) + A2 (2010)	80 MHz - 2000 MHz
EFT	EN 6100-4-4 (2004) + A1 (2010)	-
Conducted Immunity	EN 6100-4-6 (2009)	150 kHz 80 MHz
Power Supply Failure	EN 6100-4-11 (2004)	-



- Iridium Approved RPT-05119 (21-02-2013)
- IP67 Ingress Protection Test (Pending)
- HS / Statistical Code: 85176200

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6. Introduction

6.1. General information

The GTTS-3000 is an Iridium Short Burst Data Communication System that was especially designed for the maritime environment.

It enables users to have a communication line and/or track and trace vessels, barges or other assets or equipment. It uses the cost effective Iridium Short Burst Data (SBD) for communication.

The Iridium network is the only network commercially available that offers true global coverage.

The GTTS-3000 was developed in such a way that it can fulfil most of the customer needs without modifications, add-ons or special software versions.

It's ruggedized all weather proof housing and stainless steel mounting hardware was especially designed to survive under the most extreme conditions.

It finds applications in maritime vertical markets like Electronic Charts Support, M2M applications, Shore Support etc.

6.2. System description

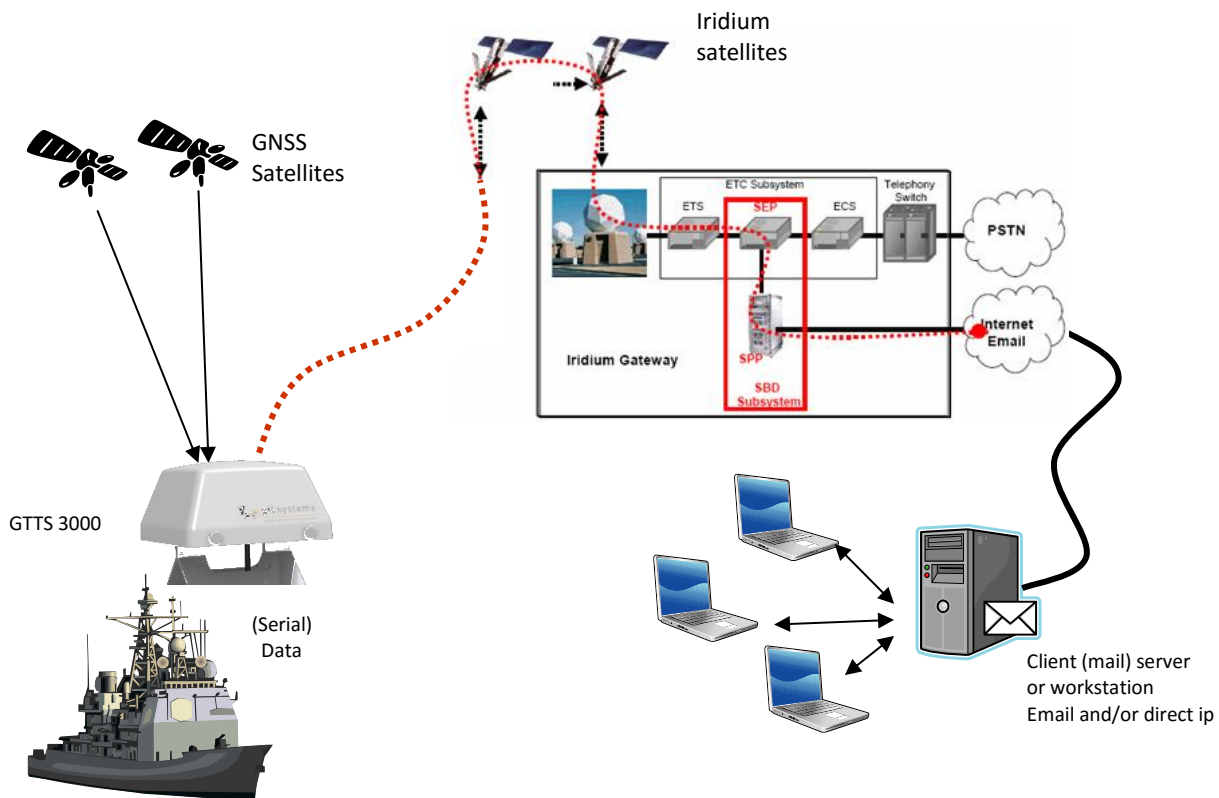


Figure 1

An installed GTTS-3000, running the GTTS protocol that uses the messagepack format (see www.msgpack.org), will retrieve the GNSS data at preset time intervals. The position is then send through the Iridium satellite constellation to the Iridium Gateway. In the Gateway the data is processed and send to pre-configured IP-address(es) and/or E-mail address(es).

Depending on the end-user's application, it is often desired to use geographical maps to display the position along with other information. An example of a GTTS-3000 series on a GEO map can be found in figure 2 below.

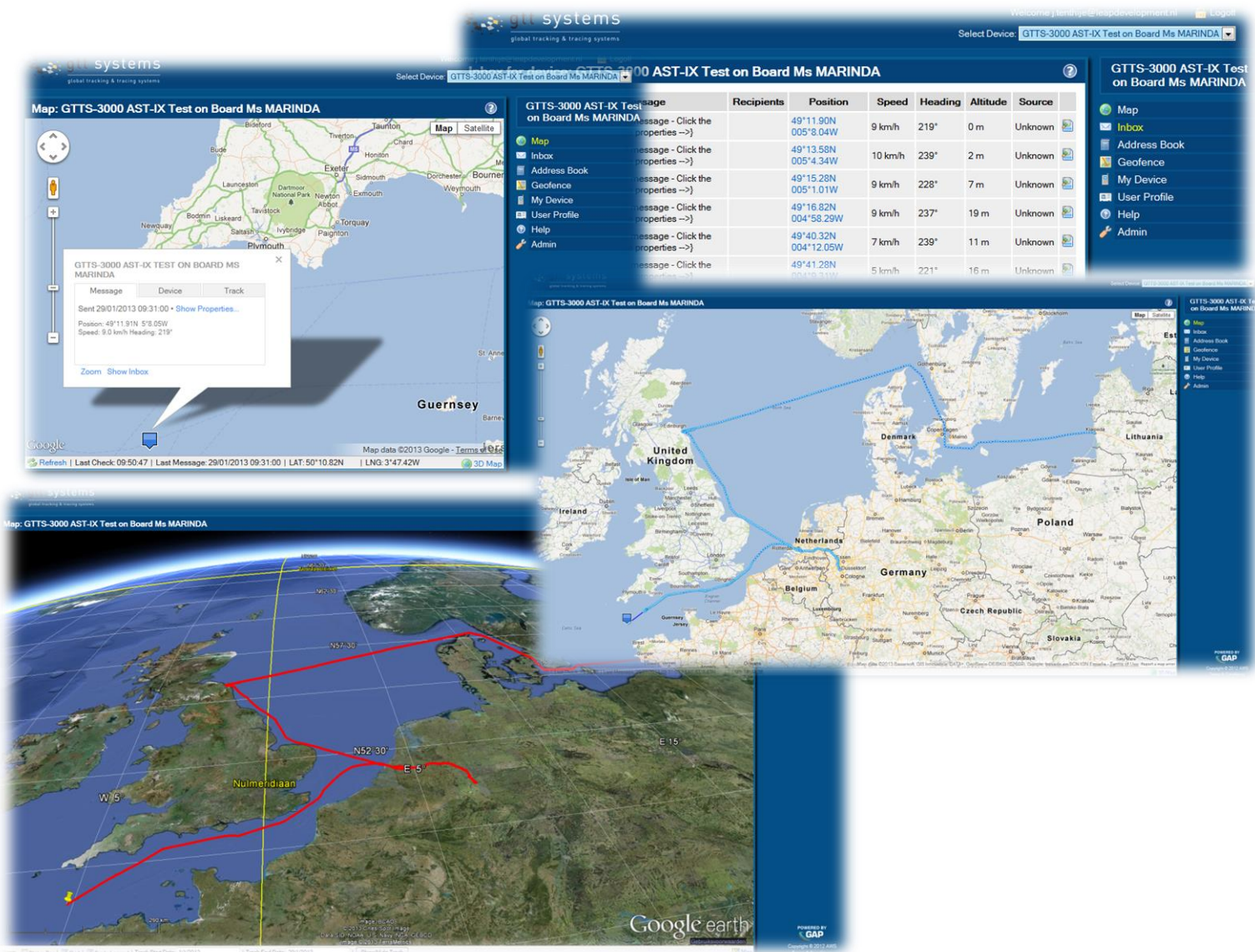


Figure 2. GTTS-3000 series on AWS Global Alerting Platform

All the dealers of the GTTS-3000 series Iridium Short Burst Date Communication System have their own GEO services, or can provide it.

For the dealer list please visit: <http://www.gtts.eu/services/dealers/>

7. Installation

7.1. Unpacking

The GTTS-3000 is packed in a carton box. Unpacking of the GTTS-3000, especially if it is provided with magnets, should be done on location prior to installation.

GTTSystems uses the unique IMEI number of the embedded Iridium SBD modem for unit identification and registration.

Each box contains at least a GTTS-3000 provided with a factory connected installation cable and a brief installation guide. This complete Installation and User's manual can also be found <http://www.gtts.eu/products/gtts3000/in.pdf> in pdf format.

7.2. Activation in the Iridium Network

Prior to mechanical and electrical installation the GTTS unit shall be activated in the Iridium Satellite Network.

Authorized dealers only can send an email to activate@gtts.eu with a list of IMEI numbers of the units that needs to be activated. Only activation requests from authorized dealers can be processed. The IMEI numbers can be found on 2 different barcode labels on the bottom of the unit and also on a barcode label on the carton packing. IMEI nr. always starts with 300234.....

Activation is normally realized the same day during GTTSystems B.V. business hours.

Your subscription starts from this day.

7.3. General installation **READ THIS FIRST**

The GTTS-3000 is easy to install. It offers three different types of installation.

- Tube/railing mounting.
- Magnet Mounting on deck or rooftop.
- Screw mounting on deck or rooftop.

It shall always be installed in a horizontal position with no obstructions to the sky (clear view to the sky).

The GTTS-3000 will send a first GPS position automatically to confirm the unit is switched on and working properly. Please note that it can take several minutes before a message from the unit is received (depending on satellites in sight). GPS takes typically 40..50 seconds for a cold start fix.

Latency in the Iridium Network is very low. Typical values measured 12 .. 15 seconds

The Basic Indoor Connection Box (GTTS-3000 BIC Box) comes along as standard with each GTTS-3000 system. It makes the electrical installation easier, reliable and safer.

Besides the ease of installation, it has two LED indicators for power status and system status. The BIC Box is also provided with a serial RS485 port that can be used for software upgrades and also functions as a debug, monitor or data port. With an off-the-shelf RS485<>USB converter it is very easy to connect the GTTS-3000 through the BIC Box to a computer.

7.3.1. Installation with magnet mounting

Holding the GTTS-3000 with both hands, hold it over the area where it shall be placed. Tilt the GTTS-3000 appr. 45 degrees as shown in figure 3 below. Then lower it onto the steel surface and turn the GTTS-3000 until the magnets make contact with the steel surface. Try to do this as controlled as possible to avoid a 'slam' and keep your fingers free from the GTTS-3000 surface contact area. Slamming the unit onto the steel surface could cause damage due to extreme G-forces that might occur.

Reverse this procedure to remove an unit.

Never try to slide a unit. This will damage the magnetics corrosion protective coating and the steel (paint) surface it is mounted on.

It is advised to coat the magnets with ship's paint or other corrosion protective coating, if available on board, prior to installation.



Figure 3. Placement on top level deck.

The connection cable shall be routed and fixed properly to avoid dangerous situations that might occur due to loose cables.

Decent installation is a must for all of the mounting options.

7.3.2. Installation on railing or tube

The mounting hardware of the GTTS-3000 has a clever design that allows tube clamp mounting on a wide variety of tube diameters ranging from 32mm to 60mm.

Installation on a railing or tube with a diameter less than 40mm:



Please note the orientation of the lower mounting plate

Installation on railing or tube with diameter larger than 40mm:



Please note the orientation of the lower mounting plate

It is advised to wrap a sheet of thin rubber around the tube or railing to protect the paint coating. It also will add to the clamp's grip.

Do not over tighten the four M5 bolts. (Maximum torque 4Nm) Use an 8 mm spanner.

7.3.3. Installation with screw mounting

If the GTTS-3000 should be installed using 4 pieces M5 bolts, drill 4 holes \varnothing 5,5 mm according the drill plan. See figure below.

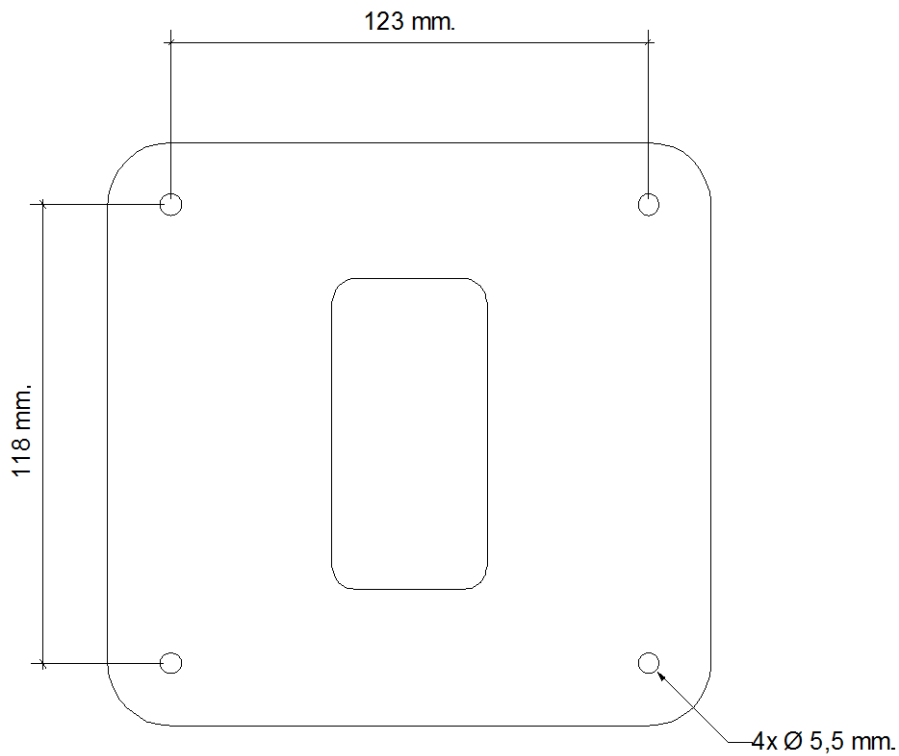


Figure 6. Drill plan

If the (platform) screw mounting installation is desired, pay special attention to the possible water ingress due to the drilled holes in the mounting surface.

7.4. Electrical Installation

The GTTS-3000 transceiver (outdoor part) comes prewired with a six or eight wire screened cable. Connecting the V+ and V- wire to an 1Amp/12..24V DC power supply is all that is needed to make the GTTS-3000 operational. We suggest to place an inline fuse of 1Amp slow. Although the power supply input is protected against polarity reversal and voltage transients it is good practice to check (color coding) scheme once again before supplying the permanent voltage supply.

6 wire cable

Number	Color	Function	Remarks
1	Pink	Open collector output	0.7 A / 60Vdc (sink)
2	Grey	Opto coupled digital input	5..24Vdc / 2..11mA
3	Yellow	RS485/RS422 Data+	Positive going
4	Green	RS485/RS422 Data-	Negative going
5	Brown	V+ IN	8..36Vdc / 1A Max.
6	White	V- IN	0V
7	Yellow/Green	Shield	DC isolated from 0V

8 wire cable

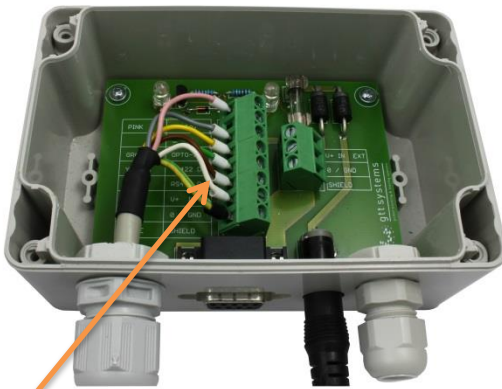
Number	Color	Function	Remarks
1	Blue	LED	Control of status LED
2	Pink	Open collector output	0.7 Amps / 60Vdc (sink)
3	Red	Analog input	0..30Vdc
4	Grey	Opto coupled digital input	5..24Vdc / 2..11mA
5	Yellow	RS485/RS422 Data+	Positive going
6	Green	RS485/RS422 Data-	Negative going
7	Brown	V+ IN	8..36Vdc / 1A Max.
8	White	V- IN	0V
9	Yellow/Green	Shield	DC isolated from 0V

7.4.1. Electrical Installation using the BIC Box

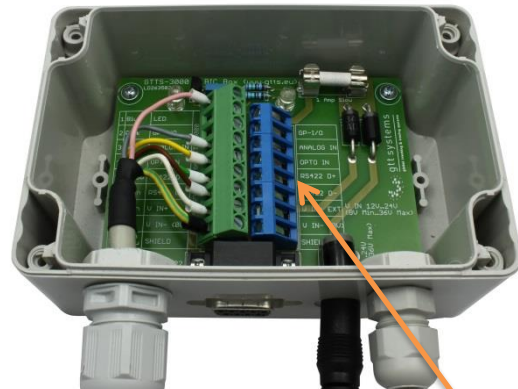
Installation becomes easier and more safe if the (standard included) Basic Indoor Connection (BIC) Box is used. It provides a 5.1mm DC jack input for 24V AC/DC adapter in parallel with a terminal block for power connection. The two DC Power inputs are separated by a diode network and it is allowed to connect both simultaneously for redundant power input. Screw type terminal blocks offer easy and proper connection of the wiring. Enclosed also an 1A. Slow blow fuse. It has a DB9 connector for easy connection to a computer or other device. It also has two LED indicator to show the Power status and the status of the device. The legenda of the four most common status's are printed on the foil. The BIC Box also provides return current protection if there is a power loss and the transceiver runs from the optional embedded backup battery.



Check below which hardware revision of the BIC box is supplied for the correct connection.



Use this connector for external wiring



Use this connector to easily connect the external wiring like Analog in, RS485/RS422 etc.

For RS485/RS422 connection, the DB9 connector can also be used.
DB9 pinout:

Pin	Function	Remarks
1	RS485/RS422 Data-	Positive going
2	RS485/RS422 Data+	Negative going
5	RS485/RS422 0V	0V

8. Configuration

The GTTS-3000's are shipped from factory in a pre-configured state.

The customers desired configuration is passed to GTTSystems B.V. by the dealers. The units are then configured, tested, packed and shipped. Currently there are three configurations released and integrated into the GTTS-3000 firmware. Two of those provide backward compatibility with the GTTS-2000 series. This allows system integrators to switch from the GTTS-2000 to the GTTS-3000 without any hassle.

Configuration can be altered "over the air".

A dedicated Windows® Platform computer configuration tool allows dealers to (re)configure or select a configuration and set a variety of setting like reporting frequency etc..

8.1. GTTS communication protocol

The GTTS 3000 can use two protocols for communication.

8.1.1. GTTS-MessagePack Generic Protocol

The GTTS-MessagePack Generic Protocol is based upon the messagepack format (see www.msgpack.org)

This protocol has a bit more overhead than the other protocols, but in return it offers great flexibility if one want to use the GTTS-3000 as a data terminal or transceiver next to, or instead of, a tracking and tracing device.

8.1.2. Maritime M2M Applications

To ease integration of the GTTS-3000 into maritime M2M (or Ship to Shore) applications, a NMEA0183 type serial protocol over the RS485 bus was developed and integrated into the GTTS-MessagePack protocol. This makes it relatively easy to send sensor data, text etc. directly to back office (server) platform. If you are using the GAP platform, data is directly visible without any alterations to the platform's layout.

9. Options

There are several options available. Most options are born out of customer demands and are already put into action in certain applications and are proven solid options.

The list of options is likely to grow over time.

9.1. Battery Backup

There is a battery backup printed circuit board available that can be placed in the outdoor unit. Advantage of having a (additional) backup battery in the outdoor unit is that the GTTS-3000 will continue working if main power source(s) are lost and/or connection cable is cut. If the GTTS-3000 starts running from its backup battery, it will indicate in the messages that it runs from backup, and a different communication protocol may be initiated to extend the operational time and/or function of the device. The battery is heated to extend the range of charging at low temperatures.

Best is to have the battery backup option installed in the factory, but it can be retro fitted by installers also.

Specifications:

- **Battery:** Lilon, 7,4 Volts – 2200mAh
- **Heater:** 5 Watts @ 24V DC (microprocessor controlled)
Heater on at temperatures below 5°C
- **Charging:** Microprocessor controlled Lilon charging. (slow charging)

9.2. GSM/GPRS

There is a GSM/GPRS printed circuit board available that can be placed in the outdoor unit. This option makes the GTTS-3000 an Iridium & GSM hybrid. This optional printed circuit board also holds possibilities for battery backup. The SIM card is placed in the outdoor unit as well. This is a slightly disadvantage in production or installation but prevents miss usage of GSM SIM cards. The antenna is embedded as well and placed vertically in the housing, stacked between the two printed circuit boards, providing vertical polarized signal orientation.

Specifications:

- **GSM/GPRS:** Quad Band modem (Telit GL865-QUAD)
- **SIM Card type:** Micro SIM (holder on pcb board)
- **Antenna:** PCB antenna stacked vertically on the PCB with MMCX connector

10. Specifications

GTTS-3000 Specifications		
Physical	Size overall (LxBxH)	19x18x9 cm.
	Height above mounting rail or deck	2 .. 7.5 cm.
	Magnets holding force	1240N (~124 Kg)
	Mounting hardware	Stainless steel 316 (A4)
	Cover UV and salt water resistant	PMMA/ABS
Environmental	Operating temperature	-40 .. +85 C
	Storage temperature	-40 .. +85 C
	Ingress Protection	IP-67 / IP-68
Electrical	Working voltage	12 .. 24 Vdc (8V min .. 36V max)
	Power consumption average	Receive: <50mA@12V / <25mA@24V
	Power consumption during SBD transmission	Transmit: <150mA@12V / <75mA@24V
	Heater	Optional (5 Watt)
	Backup battery	Optional (7.4V/2200mAh Lilon)
Interface	Serial port I/O	RS-485 / RS-422 (115k2 max)
	1 Opto coupled digital Input	5 .. 24Vdc
	1 Analog Input	0..30Vdc @12bit ADC
	1 Output (open collector protected mosfet)	0.7 A. / 60V dc (sink)
Satellite	Iridium satellites	Sort Burst Data
	Transmission delivery	Direct IP and/or E-mail
	Iridium RX/TX antenna	Integrated patch antenna
	GNSS Positioning	GPS, GLONASS, GALILEO
	GNSS RX Antenna	Integrated patch antenna
	GSM/GPRS optional	2G modem
	GSM/GPRS SIM card and antenna	Integrated in outdoor unit